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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/387,477	09/01/1999	Manabu Tomita	TIJ-26105	2630

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EXAMINER	
GUERRERO, MARIA F	

ART UNIT	PAPER NUMBER
2822	

DATE MAILED: 03/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/387,477	TOMITA ET AL.	
	Examiner	Art Unit	
	Maria Guerrero	2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 December 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-7* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-7* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in response to the amendment filed December 6, 2004.

Status of Claims

2. Claims 2 and 8-9 are canceled. Claims 1 and 3-7 are pending.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 3 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 3 recites "wherein C4F8 is used as the fluorocarbon gas having a lower ratio of carbon atoms to fluorine atoms and at least one selected from the group composed of CHF3, CH2F2 and CF4 is used as the fluorocarbon gas having higher ratio of carbon atoms to fluorine atoms". The claim is vague and indefinite because the specification describes C4F8 as the fluorocarbon gas having the higher ratio of carbon atoms to fluorine atoms and CHF3, CH2F2 and CF4 as the fluorocarbon gas having the lower ratio of carbon atoms to fluorine atoms (page 4, page 6, lines 1-10, page 7, lines 9-27). In addition, original claim 3 described C4F8 as the fluorocarbon gas having the higher ratio of carbon atoms to fluorine atoms and CHF3, CH2F2 and CF4 as the fluorocarbon gas having the lower ratio of carbon atoms to fluorine atoms.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1 and 4 are rejected under 35 U.S.C. 102(b) as being anticipated by Yanagida (U.S. 5,338,399).

Yanagida teaches providing a semiconductor substrate having a lower electrically conducting layer (2) thereon and an electrically insulating layer (3) disposed over the electrically conducting layer (2) (Fig. 1a, col. 8, lines 15-20). Yanagida shows providing a gas etchant comprising a mixed gas of two different fluorocarbon gases, each fluorocarbon gas having a different ratio of carbon atoms to fluorine atoms that have different ratios of carbon atoms to fluorine atoms (col. 11, lines 5-20, 38-43). Yanagida discloses the fluorocarbon gas having the lower ratio of carbon atoms to fluorine atoms forming at least one half of the mixed gas (col. 11, lines 38-43). Yanagida teaches etching a connection hole through the electrically insulating layer in a single etching step to the electrically conducting layer using only the mixed gas as the etchant

(Fig. 1b, col. 11, lines 5-20, 38-43). Yanagida shows the insulating layer being plasma etched with the mixed gas of fluorocarbon gases (col. 11, lines 60-62).

5. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Nguyen et al. (U.S. 6,001,699).

Nguyen et al. teaches providing a semiconductor substrate having a lower electrically conducting layer thereon and an electrically insulating layer disposed over the electrically conducting layer (Fig. 2B-2C, Abstract, col. 5, lines 5-20, col. 6, lines 1-45). Nguyen et al. shows providing a gas etchant comprising a mixed gas of two different fluorocarbon gases, each fluorocarbon gas having a different ratio of carbon atoms to fluorine atoms that have different ratios of carbon atoms to fluorine atoms (Abstract, col. 5, lines 64-67). Nguyen et al. discloses the fluorocarbon gas having the higher ratio of carbon atoms to fluorine atoms forming at least one half of the mixed gas (Abstract, col. 5, lines 64-67, col. 8, lines 1-3). Nguyen et al. teaches etching a connection hole through the electrically insulating layer in a single etching step to the electrically conducting layer using only the mixed gas as the etchant (Fig. 2B-2C, col. 7, lines 20-40).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagida (U.S. 5,338,399) in view of Mizuhara et al. (U.S. 5,898,221).

Regarding claims 5-7, Yanagida does not specifically show the upper electrically conducting layer (electrode or wiring) connected to the lower electrically conducting layer. Yanagida does not specifically show the lower conducting layer having a titanium nitride layer, a layer of aluminum, a titanium layer and a titanium nitride layer stacked in that order. Yanagida does not specifically show the electrically insulating having the silicon oxide layer formed from TEOS, the spin-on glass layer, and the silicon oxide formed from TEOS stacked in that order. However, Mizuhara et al. shows the upper electrically conducting layer (electrode or wiring) connected to the lower electrically conducting layer (Fig. 9, col. 5, lines 5-9). Mizuhara et al. teaches the lower conducting layer having a titanium nitride layer, a layer of aluminum, a titanium layer and a titanium nitride layer stacked in that order (Fig. 3, 8-9, col. 3, lines 37-40). Mizuhara et al. discloses the electrically insulating having the silicon oxide layer formed from TEOS, the spin-on glass layer, and the silicon oxide formed from TEOS stacked in that order (Fig. 7-8, col. 4, lines 25-60).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Yanagida reference by including the specific configuration suggested by Mizuhara et al. in order to provide a multiplayer wiring structure having low pollution, low damage and improved reliability (Mizuhara et al., col. 1, lines 5-12; Yanagida, col. 3, lines 50-54).

Response to Arguments

7. Applicant's arguments with respect to claims 1 and 4-7 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's arguments filed December 6, 2004 have been fully considered but they are not persuasive. The amendment to the specification does not overcome the 35 USC 112 rejection because the specification and the original claim 3 described C4F8 as the fluorocarbon gas having the higher ratio of carbon atoms to fluorine atoms and CHF3, CH2F2 and CF4 as the fluorocarbon gas having the lower ratio of carbon atoms to fluorine atoms (see original specification, page 4, page 6, lines 1-10, page 7, lines 9-27). The scope of the claim is uncertain because the specification as amended in page 3 describes C4F8, CHF2, and CF4 as gas with low C/F ratio. Clarification is requested.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kuroda (US 6,593,230) teaches using a gas etchant comprising a mixed gas of two different fluorocarbons C4F8 and CHF3 (col. 6, lines 45-50). Chung

(US 6,040,247) teaches using a gas etchant comprising a mixed gas of two different fluorocarbons CHF3 and CF4 (col. 5, lines 35-40).

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 571-272-1837.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

February 23, 2005

MARIA F. GUERRERO
PRIMARY EXAMINER